Gov. Doc
Can
F

SCI. MED. DIV.

Fisheries Research Board of Canada, Biological Station, St. Andrews, N. B.

General Series Circular No. 34, October, 1961

LIBRARY
NOV - 9 1961
UNIVERSITY OF TORONTO

Progress in Rehabilitating Disease Affected Oyster Stocks*

By R. E. Drinnan and J. C. Medcof

3 1761 11674013 5

INTRODUCTION

Many people know about the devastating disease that has been affecting mainland stocks of our Atlantic oysters and they enquire frequently about its course. This circular reviews available information. It also tries to interpret this information and forecast mainland developments.

HISTORY OF DISEASE

In Prince Edward Island

Malpeque Bay, Prince Edward Island, was our first area to be affected by the east-coast oyster disease which is sometimes referred to as Malpeque Disease. This disease, which is harmless to consumers, struck there in 1915 and within 3 years over 90% of the oysters were dead. Some of the survivors were resistant to the disease and produced disease-resistant young. These gradually repopulated the bay and by 1935, 20 years after the first mortality, production of Malpeque oysters had recovered to its pre-epidemic level.

Between 1915 and 1937 similar epidemics occurred in the other oyster-producing areas of Prince Edward Island. When the important Charlottetown Harbour-Hillsborough Bay area was affected, disease-resistant Malpeque oysters were planted there and its oyster production recovered in 10 years. It appeared that this earlier recovery was due to spawning by the transplanted resistant oysters.

In New Brunswick and Nova Scotia

In 1955, oyster stocks on the mainland began to show mortalities. Losses in affected areas usually approached 100% by the end of the second year. The disease spread rapidly and by the end of 1960 all major areas in New Brunswick and all those west of Cape George in Nova Scotia had been affected. Right now eastern Nova Scotia is threatened.

*This is number 60 in the series of publications of interest to east-coast oystermen. The last was "Use of the Escalator in Oyster Farming" which appeared in the Department of Fisheries publication Trade News, September 1960.

From comparisons with epidemics on Prince Edward Island it appears beyond doubt that all the Island and mainland mortalities have been caused by the same disease, although the germ has not yet been identified.

REHABILITATION EFFORTS

Planning

By 1956 the situation in many parts of New Brunswick and Nova Scotia was already desperate. The industry was reeling from the worst catastrophe it has ever known. Whole fisheries had collapsed and the disease was still spreading rapidly. It seemed likely that unless something were done it would be 20 years before the affected areas came back into production. It also seemed likely that the recovery period could be reduced to 10 years, like that for the Charlottetown area, if resistant Prince Edward Island oysters were introduced to act as breeding stock. Careful checking of two small-scale 1956 transplants showed that Island oysters survived well for at least a year after they were moved to mainland areas where native oysters were dying from disease. With this encouragement the Department of Fisheries and the Fisheries Research Board drew up a 3-year plan for mass transfers of Island oysters to devastated mainland areas. It was hoped that these transferred oysters would (1) survive, (2) breed and (3) produce disease-resistant spat to rebuild (rehabilitate) the oyster populations. But because the results were uncertain, provisions were made for careful checking on each of these three points. The Department of Fisheries assumed responsibility for purchasing and transferring the oysters and the Fisheries Research Board for the checking.

Transplantings

Transplants made to date are shown in the Table. Actually the work has been spread over 4 years. The oysters were fished mostly from one polluted area, Bedeque Bay, P. E. I. Most of them were valueless for the half-shell trade because they were too large and too poorly shaped. But we

believed they would be good breeding stock and that their offspring would be resistant to disease and would grow into well-shaped oysters if they settled on good bottom. This rehabilitation program created a good market for poor-shaped oysters that nobody else wanted. Island fishermen profited and now many of them are wishing they could find other customers like the Department of Fisheries for this kind of stock.

Table. Rehabilitation transplants to mainland in barrels.

One barrel holds 2½ Imperial bushels.

Area	1957	1958	1959	1960	Total
New Brunswick					
Shippegan	1,000	100			1,100
Caraquet Bay			1,100	525	1,625
Lameque Bay			300		300
Miscou Harbour			500		500
Miramichi Bay		2,800	200		3,000
Kent County Areas		1,500	300		1,800
Shediac Bay				9	9
Tracadie Bay				200	200
					8,534
Nova Scotia					
Wallace-Malagash Area	500				500
Caribou Harbour		55	380		435
Pictou Harbour		45			45
Brûlé-Tatamagouche			1,000		1,000
Merigomish Area			220	140	360
					2,340
					10,874

CHECKING IN TRANSPLANT AREAS

The checking program has required the use of hundreds of trays supplied and maintained by the Experimental Oyster Farms, observations by the Board's staff on thousands upon thousands of oysters and the keeping of careful records.

Survival of Transplanted Oysters

We have placed samples of the imported Island oysters on trays in each planted area and have examined them periodically. Their mortality has averaged about 7% per year which is well within the normal range for healthy oysters. Native oysters in these same areas have continued to die. This shows that the Island oysters are little affected by the transplant operation and are resistant to the disease that has affected the mainland stocks.

Spawning

You cannot easily prove that oysters spawn unless you actually see them in the act. None of the transferred oysters were seen spawning but those we have examined in early summer appeared ready to spawn and those we have examined in late summer looked spent. We think they spawned and produced spat.

Resistance of Spat

Having established that the transplanted oysters were disease-resistant and having indirect evidence that they have spawned, the next step in the program of checking was to answer the question, "Are the spat now settling in the planted areas disease-resistant?" To answer this we have studied collector spat and wild spat found attached to natural cultch on the beaches.

Collector spat caught at Malagash, N.S., in 1957, were placed on trays there that year. And the same was done at Shippegan, N.B., in 1958 and at Mill Creek, a tributary of the Richibucto River, in 1959. In each succeeding year spat caught in these three areas have been placed on trays and carefully observed. For comparison, resistant collector spat from Bideford River, P.E.I., and susceptible collector spat from Cape Breton Island, N.S., have been brought to these three places each year and placed on trays alongside the native spat for comparison. To complete the experiment, some Bideford River collector spat have been held in Bideford River.

Collector spat from Bideford River are showing variable but low mortalities (5 to 12%) in their first year and up to 13% by the end of their second year. In contrast, mortalities of Cape Breton spat reach 4 to 20% in their first year and 50 to 60% by the end of their second year. Thus it is impossible to dis-

tinguish between susceptible and resistant spat during their first year. Their mortalities may be about the same. But the difference shows clearly in the second year. Apparently the animals must be exposed for a year before the disease begins to take effect. Because of this we cannot hope to discover whether 1959 spat from any area are susceptible or resistant until they are two years old - that is, until the autumn of 1961. And we must wait until the autumn of 1962 to find out about spat collected in 1960. With these limitations we can decide whether the native spat from any of the tested areas are resistant or susceptible merely by comparison. If their mortality rate is similar to that of the Bideford River spat, they are resistant. If it is similar to that of Cape Breton spat, they are susceptible.

Right now we can say definitely that a high proportion of the 1957 collector spat taken at Malagash are susceptible. Their mortality after 2 years (90%) is even higher than that of Cape Breton spat. Similarly most of the 1958 spat taken on collectors at both Malagash and Shippegan are susceptible.

Small wild oysters were found in abundance on shells and pebbles on beaches in many places including Malagash and Shippegan in 1960. Similar stocks have been observed in 1961. The age of these is impossible to determine exactly but they are almost certainly no more than 2 or 3 years old. It has been argued that their presence indicates that resistant spat are being produced in the rehabilitated areas. If this is true, it means that our experimental collector spat held on trays are giving us a too dismal picture.

Actually it is impossible to say what the presence of these small wild oysters signifies. They are almost certainly old enough to have already suffered heavy mortalities (60 to 90%) like those that have occurred in our trays of 2-year-old collector spat. This could mean that the small, wild oysters are the surviving remnant (10 to 40%) of a stock of susceptible spat that are doomed to die. This could be true, first, because we know that the years 1958 and 1959 produced heavy spatfalls (amongst the heaviest we have ever seen in the Maritimes) and, second, because many of these small, wild oysters died when we put samples of them on trays in 1960.

In summarizing we must also admit that a high proportion of the spat that have settled in rehabilitated mainland areas are not showing the high level of resistance we hoped for, but it is encouraging to find any young oysters on the mainland. We hope some are resistant and will breed more of their kind.

PROSPECTS FOR THE MAINLAND FISHERY

What has been happening to the spat which have settled at Malagash and Shippegan is by no means clear and it is impossible to make firm predictions. Nevertheless, it is worth while considering some of the possibilities.

If some of the young oysters found on the beaches are disease-resistant, we might expect a small commercial production of oysters about 1964 when they reach market size. If, however, they are all susceptible, we cannot expect a recovery of the fishery until a resistant stock is built up and this would take longer.

We are still studying what is happening and we should be able to issue sounder predictions in another year. We hope to discover remedial measures in case these are needed in the areas where transfers have been made. And we hope to discover how to make more effective rehabilitation transfers in case these will be needed in other areas, such as those in eastern Nova Scotia, where the disease seems likely to spread in the next few years.

FURTHER INFORMATION

This is a brief report on the disease and on what is being done to combat it. For more detail you are invited to read reports number 48, 49 and 50 in the index which appeared in our Circular No. 32 entitled "Useful Publications for Oyster Farmers of the Maritimes". You may also read, "Large-scale oyster transfer", "Canada's shellfish resources", and "Use of the escalator in oyster farming", which appeared in the August 1958, March 1959, and September 1960 issues of "Trade News", published by the Department of Fisheries, Ottawa.

FISHERIES RESEARCH BOARD
OF CANADA
BIOLOGICAL STATION
ST. ANDREWS, N.B.

The Librarian,
University of Toronto,
Toronto 5, Ontario.